

ONTARIO MINISTRY OF ENVIRONMENT



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OPERATING SUMMARY

BELLEVILLE

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1972
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MINISTRY OF THE
ENVIRONMENT

1972

**TD
367
.A56
B45
1972**

Belleville : water pollution
control plant.

81619



Ministry of the
Environment

135 St. Clair Avenue West
Toronto 195, Ontario

We are pleased to present you with the 1972 operating summary for the water pollution control plant serving your community.

This summary contains data on the performance of the plant as well as relevant financial information. Of particular interest is the review of the year's activities in which significant items of these data are discussed in some detail by the operations engineer and his staff who, by their day-to-day involvement with the operation, are thoroughly familiar with the plant.

We appreciate your continuing interest in protecting the environment through the efficient operation of this wastewater treatment facility.

D. S. Caverly,
Assistant Deputy Minister.

D. A. McTavish, P. Eng.,
Director,
Project Operations Branch.

MINISTRY OF THE ENVIRONMENT

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DEPUTY MINISTER
E. Biggs

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EXECUTIVE DIRECTOR
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PROJECT OPERATIONS BRANCH

DIRECTOR
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ASSISTANT DIRECTOR
C. W. Perry

ACTING REGIONAL SUPERVISOR
B. W. Hansler

OPERATIONS ENGINEER
J. Dick

135 St. Clair Avenue West
Toronto 195

BELLEVILLE
WATER POLLUTION CONTROL PLANT

operated for
THE CITY OF BELLEVILLE
by the
MINISTRY OF THE ENVIRONMENT

1972 ANNUAL OPERATING SUMMARY



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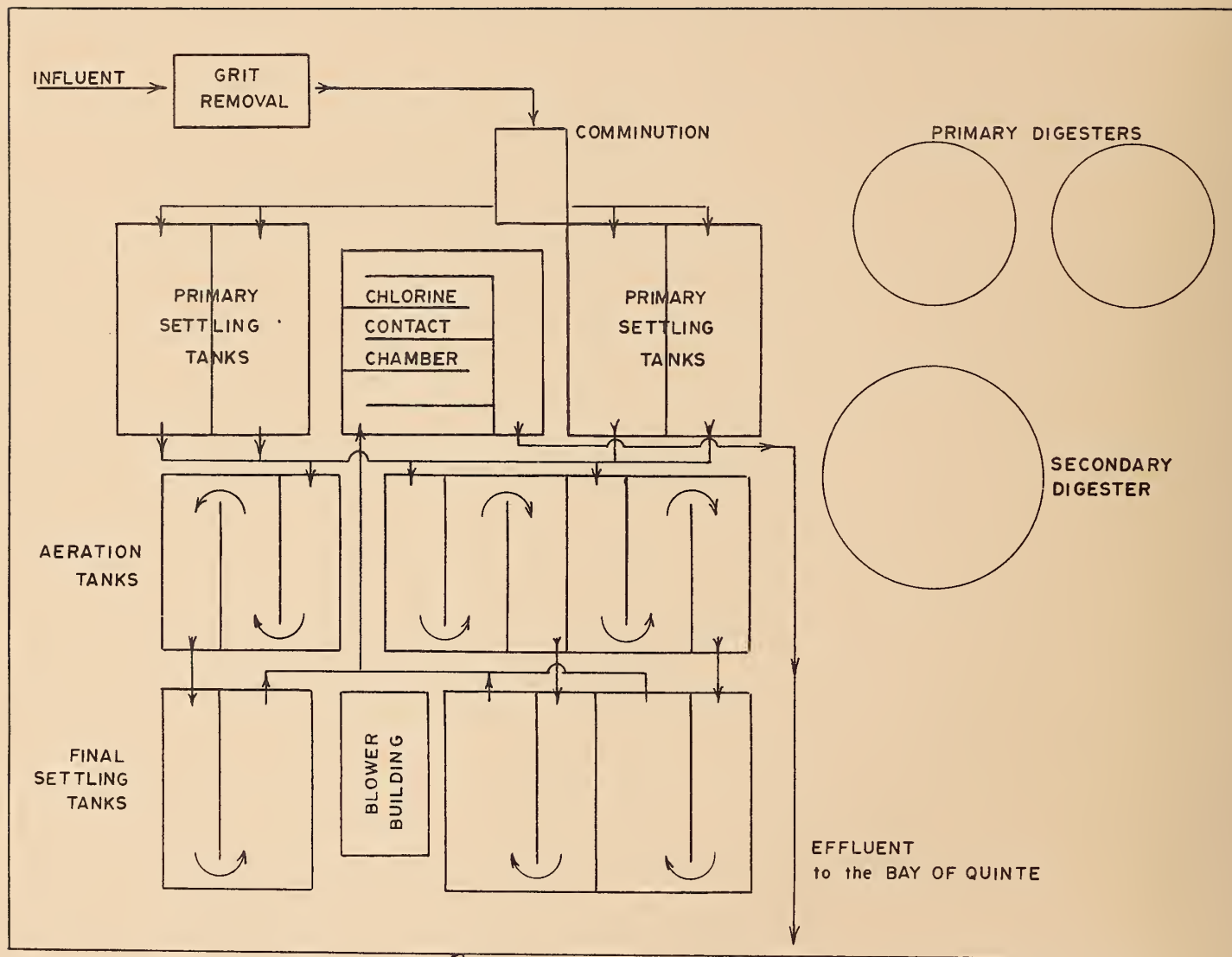
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PROJECT NO. 1-0004-66

TREATMENT Activated Sludge

DESIGN FLOW 8.0 mgd

DESIGN POPULATION 52,000

BOD - Raw Sewage 130 mg/l
- Removal 88%

SS - Raw Sewage 175 mg/l
- Removal 91%

PRIMARY TREATMENT

Grit Removal

Type: Aerated grit tank with grab bucket

Size: Two 24' x 24' x 12½'
(52,400 gal)

Retention: 9.4 minutes

Air Supply: Two Roots blowers
610 scfm each

Two Aerzener Rotary 350 scfm
each

Screening

Type: Mechanically cleaned

Size: 2" opening

Comminution

Type: Two Chicago Pump
barminutor Model C-36

Primary Sedimentation

Type: Falk

Size: Four 70' x 36' x 12'
(752,000 gal total)

Retention: 2.3 hours

Loading: Surface; 795 gal/ft²/day
Weir; 14,700 gal/ft/day

SECONDARY TREATMENT

Aeration Tanks

Type: Diffused air, three pass

Size: Three 60' x 20' x 12' of 3
passes
(809,000 gal total)

Retention: 2.4 hours

Air Supply

Type: Aerzen Maschinen fabric

Size: Three 2280 scfm @ 7 psi

Diffusers

Type: Sparjers - 5/16"

Spacing: 4 inch centers

Secondary Sedimentation

Type: Falk

Size: Three 83' x 56.5' x 12'
(2 pass)
(1,070,000 gal total)

Retention: 3 hours

Loading: Surface 800 gal/ft²/day
Weir 13,000 gal/ft/day

CHLORINATION

Type: Fischer & Porter
Size: One 1,000 lb/day
One 1,500 lb/day

Chlorine Contact Chamber

Size: 54.7' x 60' x 11' (167,000 gal)
Retention: 30 minutes

Outfall

Approx. 280' of 48" dia. concrete pipe
and 1179' of 36" dia. concrete pipe to
Bay of Quinte

SLUDGE HANDLING

Digestion System

Type: Two stage

Primary:

Type: Gas mixed
Size: Two 45' dia. x 27' swd
(79,400 ft³ total)

Secondary:

Type: Non mixed
Size: One 55' dia. x 27' swd
(59,400 ft³ total)

PUMPING STATIONS

a) Plant site @ 35' tdh

One Worthington 2500 gpm (electric)
One Worthington 1666 gpm (electric)
One Worthington 2500 gpm (electric and diesel)

b) Front Street

One Worthington 2500 gpm (electric @ 55' tdh)
One Worthington 1666 gpm (electric @ 55' tdh)
One Worthington 3332 gpm (diesel and electric
@ 55' tdh)
One Fairbanks Morse 4400 gpm (diesel @ 42'
tdh)

c) Dundas Street West

One Worthington 416 gpm (electric @ 29' tdh)
One Worthington 1300 gpm (diesel @ 40' tdh)

'72 Review

GENERAL

This was the first full year of operation of the expanded 8.0 mgd activated sludge sewage treatment plant. The one year warranty period occurred in August of 1972. Only minor deficiencies required correction by the general contractor.

Extensive work was carried out at the Front Street pumping station to connect the new 44 inch Moira River trunk sewer into the main pumping station.

The primary digester was cleaned out during the spring of 1972. This clean out was carried out much quicker than the previous clean-out of the secondary digestion in 1971, primarily from experience that was gathered during the first clean out. A new 6-inch submersible pump was purchased and the bottom contents were pumped out through a new access chamber that was built adjacent to the digester. This will also enhance future clean outs if and when this becomes necessary.

The plant grounds were landscaped during the year as suggested by the Parks and Recreation Department which enhanced the treatment plant site considerably. A new plant sign was also constructed that blended in very nicely with the new landscaping. As was previously discussed with the City of Belleville, the easterly property more commonly referred to as lot #11 was leased back to the City for a 20-year period. Phosphate removal studies were also commenced in 1972. This preliminary step consisted of jar tests which indicate the quantity of chemical required and the chemical most economical for this purpose. The jar tests are followed by full scale plant operation to see whether the laboratory results conform to actual practice.

Some mechanical repairs undertaken during the year involved the repair of two broken force mains at the Dundas Street pumping station, the replacement of the two original blowers in the raw sludge building and the replacement of 2 sump pumps.

Problems were encountered with the disposal of digested sludge. Complaints from the Township of Thurlow residents resulted in the Township Council passing a by-law restricting the disposal of sludge within its boundaries. This resulted in meetings with the Township Council and the construction of a digested sludge lagoon to contain the contents within the limits as requested by the Waste Management Branch.

An additional staff member was hired during the year, filling the complement of the staff requirements. The total plant staff now consists of 11 men. The plant staff carried out their work in a conscientious manner.

The new plant was officially opened on December 8, 1972. The guest speakers at the official opening were the Honourable James Auld and the Honourable Dr. Potter. The plant opening was followed by a brief tour of the plant and a luncheon in the Legion Hall in the City of Belleville.

EXPENDITURES

The cost of operating the sewage works in 1972 was \$210,438.11. This cost was slightly below the budgeted amount of \$218,000.00. The cost of treating one million gallons of sewage was \$87.09.

A total of 2488 million gallons of sewage was treated. The average daily flow was 6.8 million gallons per day.

PLANT EFFICIENCY

The average concentration of BOD and suspended solids in the plant influent were 135 and 258 mg/l respectively. The average concentration of BOD and suspended solids in the plant effluent were 10 and 11 mg/l respectively. This resulted in a BOD and suspended solids reduction of 93 and 96 percent respectively. These removal efficiencies are well within the expected parameters of a well operated activated sludge sewage treatment plant.

The phosphorus content in the influent was 7.2 mg/l and in the effluent 2.6 mg/l. The phosphorus removal was approximately 64 percent. This is somewhat higher than the conventional values for an activated sludge treatment plant. However, it is felt that the oxide wastes from American Optical Company may have a contributing affect on this removal.

SLUDGE DIGESTION AND DISPOSAL

A total of 14, 757, 000 gallons of raw sludge with an average concentration of 5.7 percent was pumped to the digesters. A total of 3, 692, 000 gallons of digested sludge and 3, 687 cubic feet of grit were removed by truck.

CONCLUSIONS

The operation of the sewage works system was considered satisfactory for the BOD and suspended solids removal. The sewage flows to the plant per capita appear somewhat high and efforts should be made to reduce this flow where possible.

PROJECT COSTS

2-0084-61
NET CAPITAL COST \$863, 718. 88

DEDUCT - Portion financed by
CMHC (Final) (567, 041. 78)

Long Term Debt to MOE \$296, 677. 10

Debt Retirement Balance at Credit
(Sinking Fund) December 31, 1972 \$ 69, 833. 91

Net Operating \$ 3, 960. 39
Debt Retirement 3, 570. 00
Reserve 3, 068. 28
Interest Charged 16, 637. 34

TOTAL \$ 27, 236. 01

RESERVE ACCOUNT

Balance @ January 1, 1972 \$ 54, 026. 35

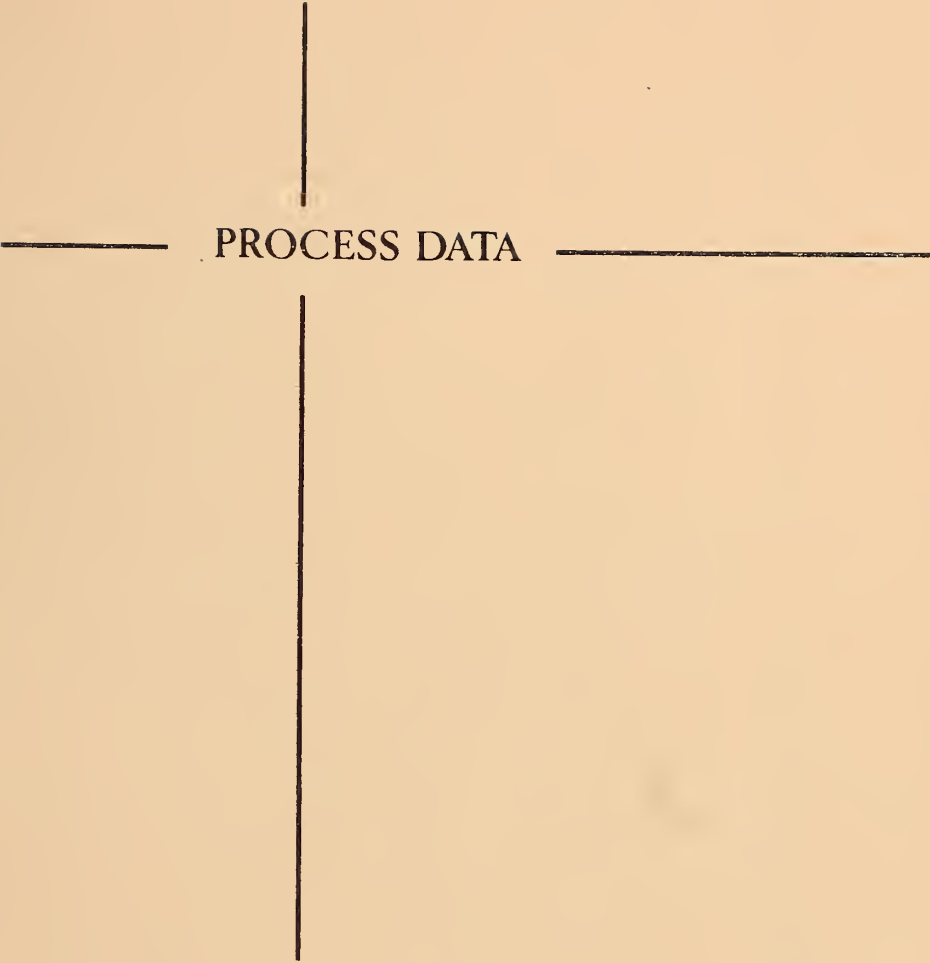
Deposited by Municipality 3, 068. 28

Interest Earned 3, 541. 33

\$ 60, 635. 96

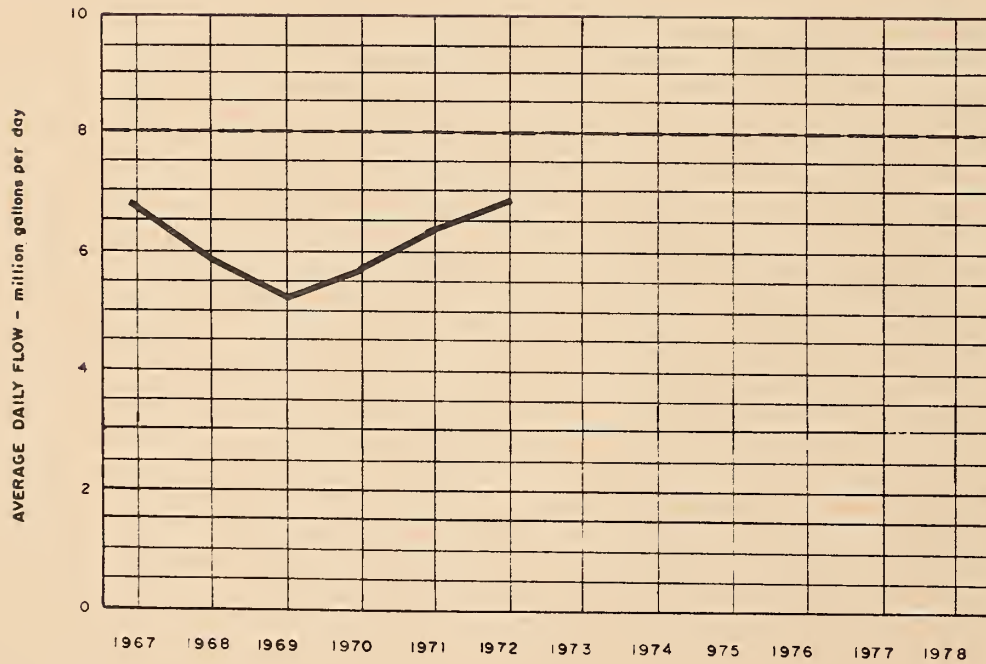
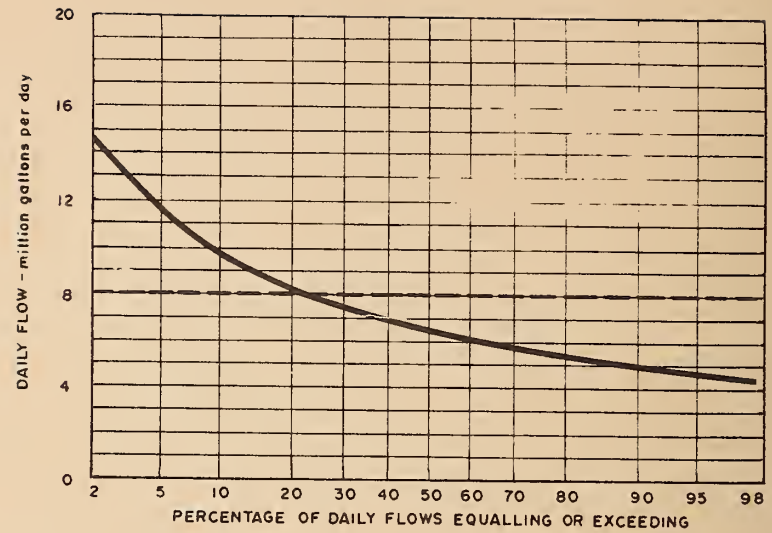
Less Expenditures -

Balance @ December 31, 1972 \$ 60, 635. 96



PROCESS DATA

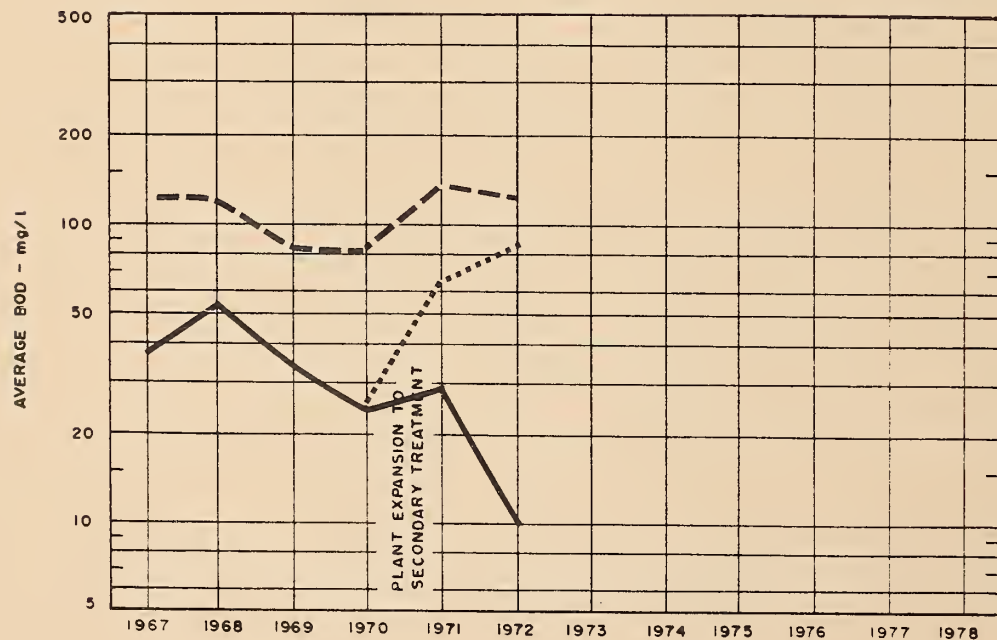
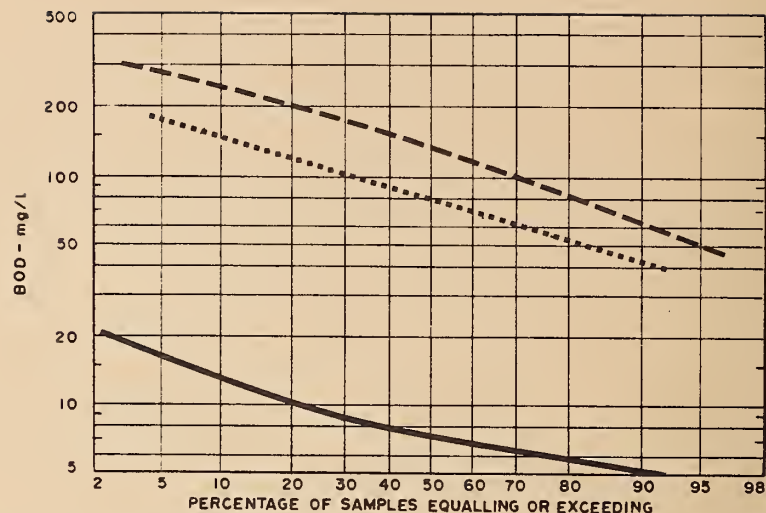
FLOWS



PLANT PERFORMANCE

MONTH	FLOWS			BIOCHEMICAL OXYGEN DEMAND				SUSPENDED SOLIDS				PHOSPHORUS	
	TOTAL FLOW	AVERAGE DAY	MAXIMUM DAY	INFLUENT	EFFLUENT	REDUCTION		INFLUENT	EFFLUENT	REDUCTION		INFLUENT	EFFLUENT
	million gallons	mil. gal	mgd	mg/l	mg/l	%	10 ³ pounds	mg/l	mg/l	%	10 ³ pounds	mg/l P	mg/l P
JAN	192	6.2	9.3	168	9	95	305	220	9	96	405	6.5	2.4
FEB	174	6.0	8.2	112	5	96	186	272	7	97	461	8.0	2.3
MAR	251	8.1	17.2	173	14	92	399	313	12	96	756	4.0	-
APR	288	9.6	17.4	110	6	95	300	167	12	93	446	3.5	2.8
MAY	229	7.4	10.7	132	7	95	286	281	6	98	630	9.6	2.5
JUNE	204	6.8	12.1	183	18	90	337	179	12	93	341	4.7	2.2
JULY	167	5.4	6.1	130	7	95	205	375	19	95	594	9.3	2.7
AUG	183	5.9	8.1	88	8	91	146	475	11	98	849	10.5	3.6
SEPT	150	5.1	8.6	148	9	94	208	320	12	96	462	8.4	3.3
OCT	196	6.3	16.3	120	7	94	221	177	6	97	335	7.3	2.8
NOV	208	6.9	14.3	108	15	86	193	227	10	96	451	5.9	2.2
DEC	246	7.9	15.5	145	12	92	327	312	16	95	728	4.7	1.7
TOTAL	2488	-	-	-	-	-	3113	-	-	-	6458	-	-
AVG.	207	6.8	MAXIMUM 17.4	135	10	93	259	258	11	96	538	7.2	2.6
No. of Samples	-	-	-	37	37	-	-	88	132	-	-	43	36

BIOCHEMICAL OXYGEN DEMAND

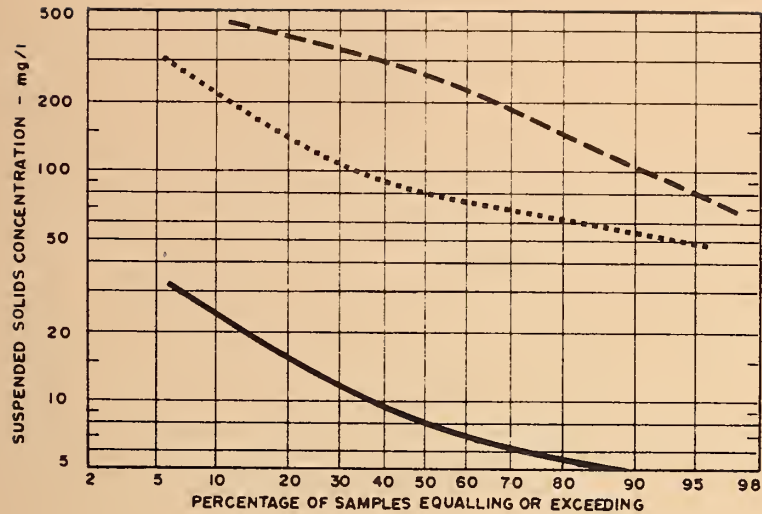


PLANT INFLUENT -----

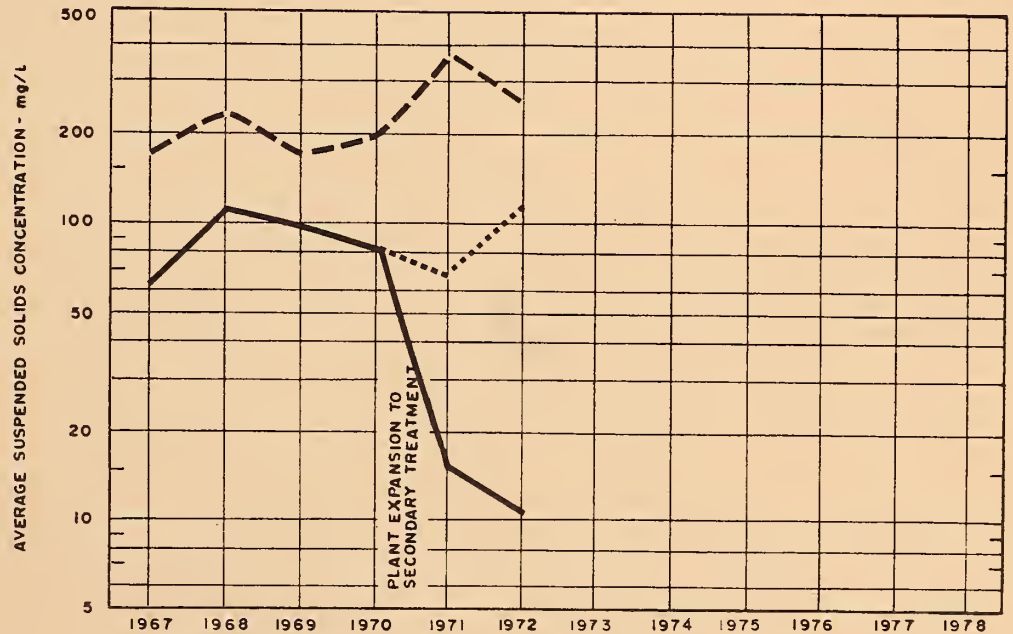
PRIMARY EFFLUENT

PLANT EFFLUENT _____

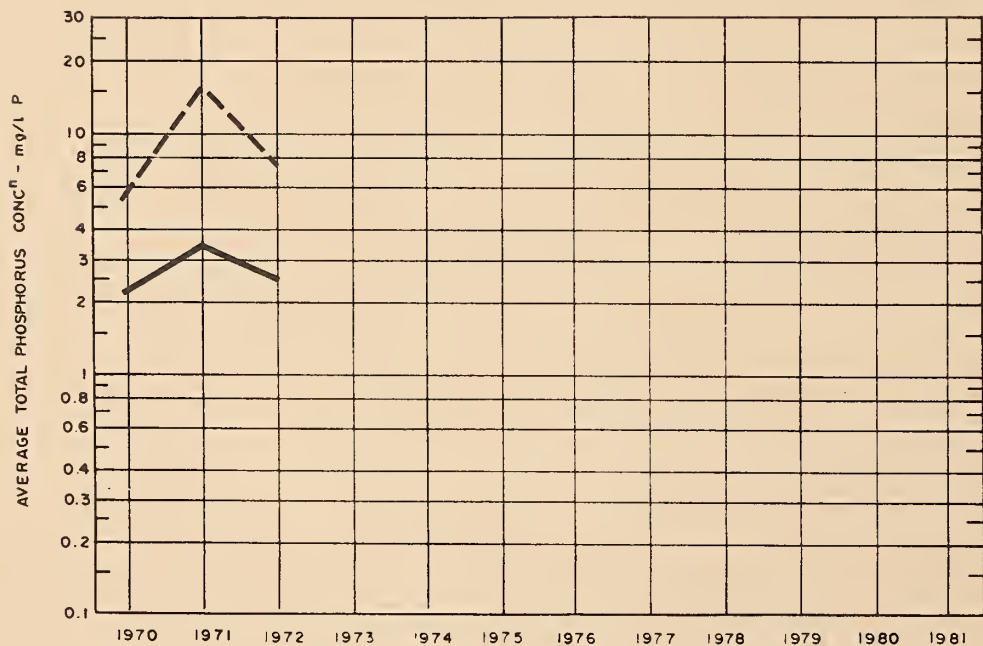
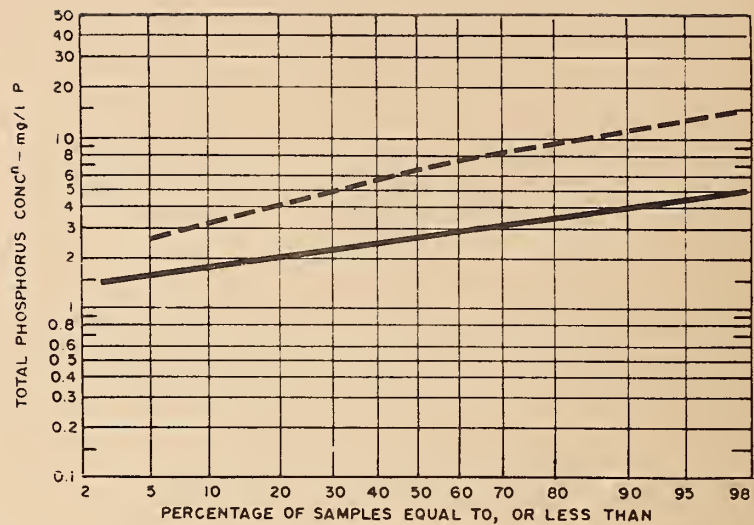
SUSPENDED SOLIDS



PLANT INFLUENT - - - - -
 PRIMARY EFFLUENT
 PLANT EFFLUENT _____



PHOSPHORUS

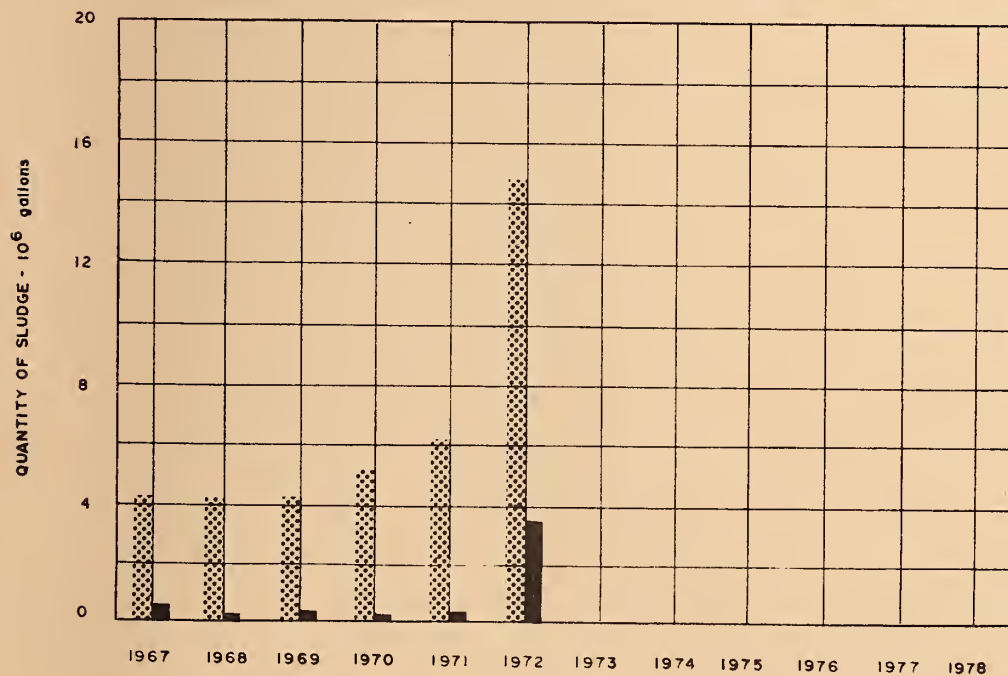
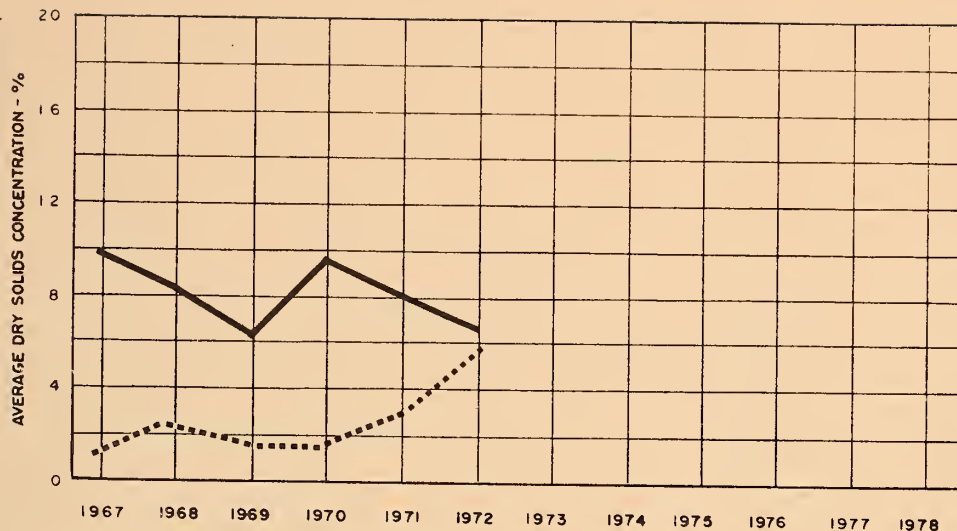


PLANT INFLUENT -----

PLANT EFFLUENT —————

DIGESTION

RAW SLUDGE
DIGESTED SLUDGE ———



RAW SLUDGE TO DIGESTER
DIGESTED SLUDGE REMOVED ———

TREATMENT DATA

MONTH	GRIT	CHLORINATION		PRIMARY EFFLUENT		AERATION			SLUDGE DIGESTION and DISPOSAL							
	QUANTITY REMOVED cubic feet	CL ₂ USED	AVG. DOSE	BOD	SUSPENDED SOLIDS	MLSS CONC	F/M	AIR	RAW SLUDGE			DIGESTED SLUDGE			SUPER- NATANT	AMOUNT HAULED
		10 ³ pounds	mg/l	mg/l	mg/l	mg/l	day ⁻¹	1000 ft ³ lb BOD	QUANTITY 10 ³ gallons	TOTAL SOLIDS %	VOL. SOLIDS %	QUANTITY 10 ³ gallons	TOTAL SOLIDS %	VOL. SOLIDS %	T. S. %	cubic yards
JAN	852	5.8	3.0	65	58	3530	.14	2.1	740	6.7	62	153	7.2	45	.2	908
FEB		5.7	3.2	63	131	4250	.11	2.1	978			63	7.8	48	.2	374
MAR		6.8	2.7	99	65	3730	.27	1.1	1300	5.9	59	87	8.0	48	.2	516
APR	675	7.0	2.4	52	61	3320	.19	1.7	1260	7.2	51	22	7.0	47	2.8	131
MAY		5.0	2.2	70	70	4090	.16	1.6	1302	7.4	40	32	7.9	46	1.2	190
JUNE	486	5.0	2.4	125	142	4160	.25	1.0	1263	6.0	54	263	7.0	49	5.5	1561
JULY	810	5.8	3.4	120	360	5330	.15	1.2	1228	5.3	50	557	6.9	48	4.2	3306
AUG		5.7	3.1	40	166	3680	.08	3.8	1304	4.2	54	357	6.9	49	1.4	2119
SEPT	378	5.4	3.7	163	290	5140	.20	0.9	1265	4.1	53	199	5.8	49	0.1	1181
OCT		5.8	2.9	97	97	3380	.22	1.3	1372	4.7	54	298	4.8	49	1.1	1769
NOV	243	6.1	3.0	74	90	2330	.27	1.7	1350	5.1	53	336	5.1	49	1.4	1994
DEC	243	6.4	2.6	63	84	2650	.23	1.8	1395	5.9	54	325	5.2	47	4.5	1929
TOTAL	3687	70.5	-	-	-	-	-	-	14757	-	-	3692	-	-	-	15978
AVG.	1.4 cu. ft/mil gal	5.9	2.9	84	111	3800	.19	1.7	1230	5.7	53	308	6.6	48	1.9	1331

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